WEINBERG LIM ENGINEERING

7 Patricia Lane . Spring Valley, New York 10977 . (845) 570-0401

Congregation Kenneses Israel
(50.05-1-5)
New Hempstead, New York, 10977

DRAINAGE
REPORT

Hydrologic assessment of the proposed development on off-site discharges

Date: 12/5/2024

WLE 23006

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Hydrologic Narrative, Methodology & Conclusion:

Hydrologic Narrative:

Congregation Knesses Israel is an existing congregation located at 698 Union Road in New Hempstead. The congregation seeks to subdivide the property and expand the parking lot. The existing residential structure on the site will be demolished and a new residential structure will be constructed on the new lot.

To achieve peak flow attenuation, an underground detention system is proposed under the expanded parking lot. All runoff from the Existing synagogue and parking areas will be routed through a pretreatment chamber into this system
A HydroCAD model of the existing and developed conditions was prepared to show the peak flow attenuation during the 1, 2, 5, 10, 25 and 100 year storm events.

Area Hydrology:

Under existing conditions, the 2.63-acre site generally drains towards one study point in the southwest corner of the site (Study Point "A") as indicated on the attached existing condition drainage area map. Under developed conditions, majority of site drains into existing curb inlet located southwest corner of the site and the balance drains to Study Point "A".

For the developed conditions, the site was configured into three distinct drainage areas, altering the flow patterns to distribute runoff more effectively. Drainage Area 1, 30,995 S.F., located on the western portion of the site, runs off towards the existing curb inlet at the southwest corner, Study Point A. Drainage Area 2, 45,205 S.F. encompasses the central part of the site, including the parking lot and driveways, and discharges into the newly proposed stormwater detention system. In the case of an extreme storm, twin 6" Ø pipes exit the system and drain to the catch basin at Study Point A. Drainage Area 3, 14,805 S.F. on the eastern portion, diverts runoff from the easternmost point around the site along the northern side to the furthest point northwest, where it discharges to the roadway and then later to Study Point A. This design ensures a reduction of peak runoff from existing conditions and improves overall site hydrology.

Methodology:

The developed site generally maintains the existing drainage pattern. Study Point "A", as indicated on the attached drainage maps, located at the Southwest corner of the property, was utilized to evaluate site runoff under pre and post development conditions.

All drainage area delineations and any changes from existing to proposed conditions are indicated on Existing and Proposed Drainage Maps provided in the Appendix.

Flows were established for existing and developed conditions utilizing the SCS Method.

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Time of concentration calculations were tabulated under existing and proposed conditions. Corresponding rainfall intensities for the design storms ranging from 1-year to 100-year were extracted from NOAA Point Precipitation Frequency Estimates. Supporting data is attached in the appendix.

Hydrologic analyses were revised for existing and proposed conditions utilizing SCS unit hydrographs.

The hydrograph calculations and summations were prepared using HydroCAD software. To establish these flows the 1, 2, 5, 10, 25 and 100 year, 24 hour storm precipitation values were derived from available NOAA data and incorporated in the HydroCAD models.

An underground detention chamber is proposed underneath the parking lot for peak flow attenuation, water quality and channel protection. The basin will be controlled by an outlet structure, which consists of two 6.0"Φ orifices.

The analysis indicates that the routed developed peak flows exiting the site at study point "A" are less than the existing peak flows for all storms ranging from the 2-year to the 100-year design frequencies.

Refer to attached HydroCAD reports for a comparison of flows produced under existing and developed conditions.

Conclusion:

The following table shows the Peak Discharge rates for existing and developed conditions for the 1, 2, 5, 10, 25 and 100 year storm events. As shown, the peak discharges for all events for the developed conditions are less than those of the existing conditions.

Peak Discharge (CFS)		
Storm Event	Existing Conditions	Developed Conditions
1 Year	0.87	0.14
2 Year	1.42	0.34
5 Year	2.43	0.81
10 Year	3.34	1.29
25 Year	1.42	0.34
100 Year	6.74	5.57

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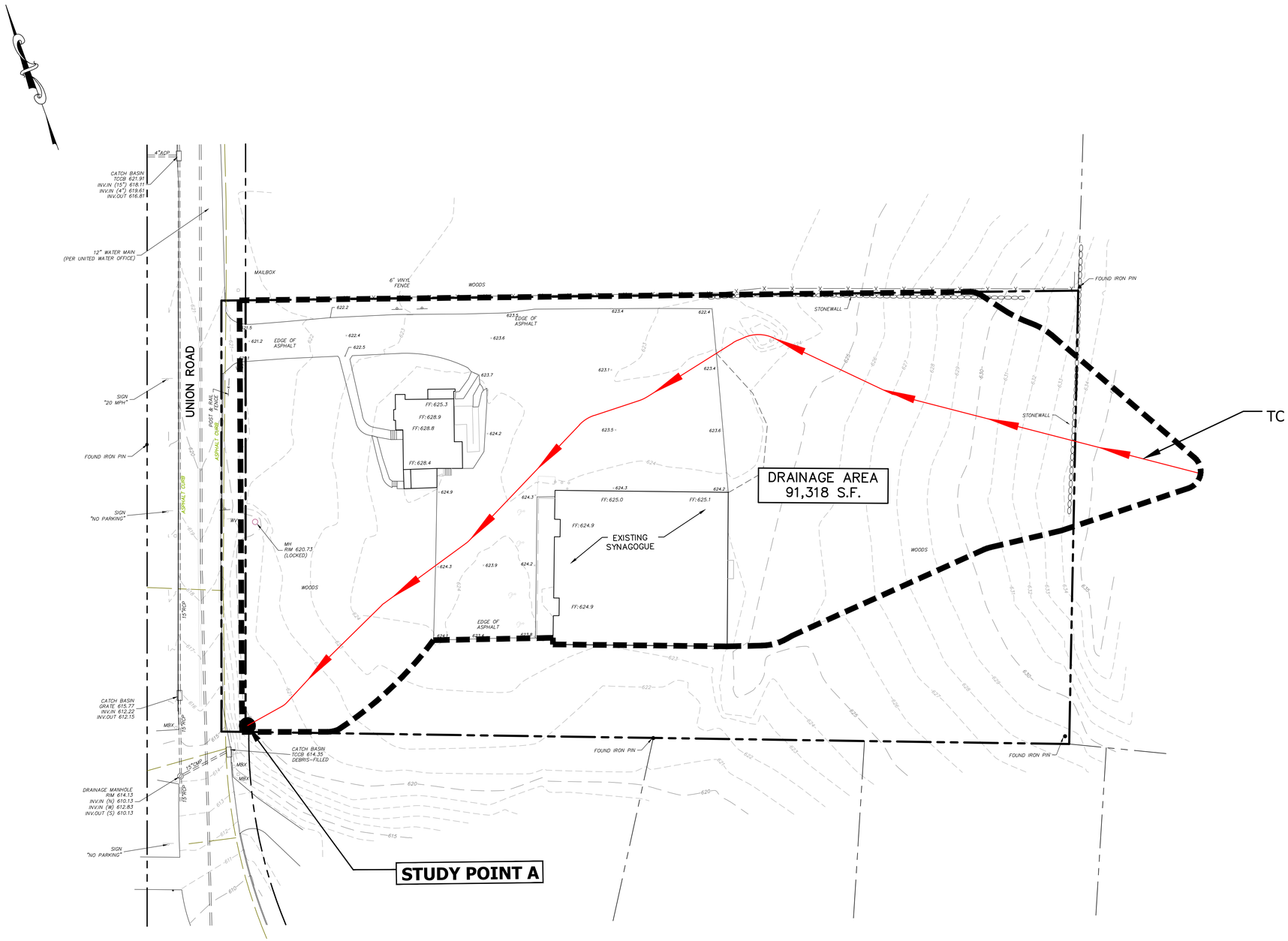
Appendix A



LEGEND

TC DRAINAGE AREA

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

REV.	DESCRIPTION	DATE
1	REVISED BULK TABLE	05/09/24

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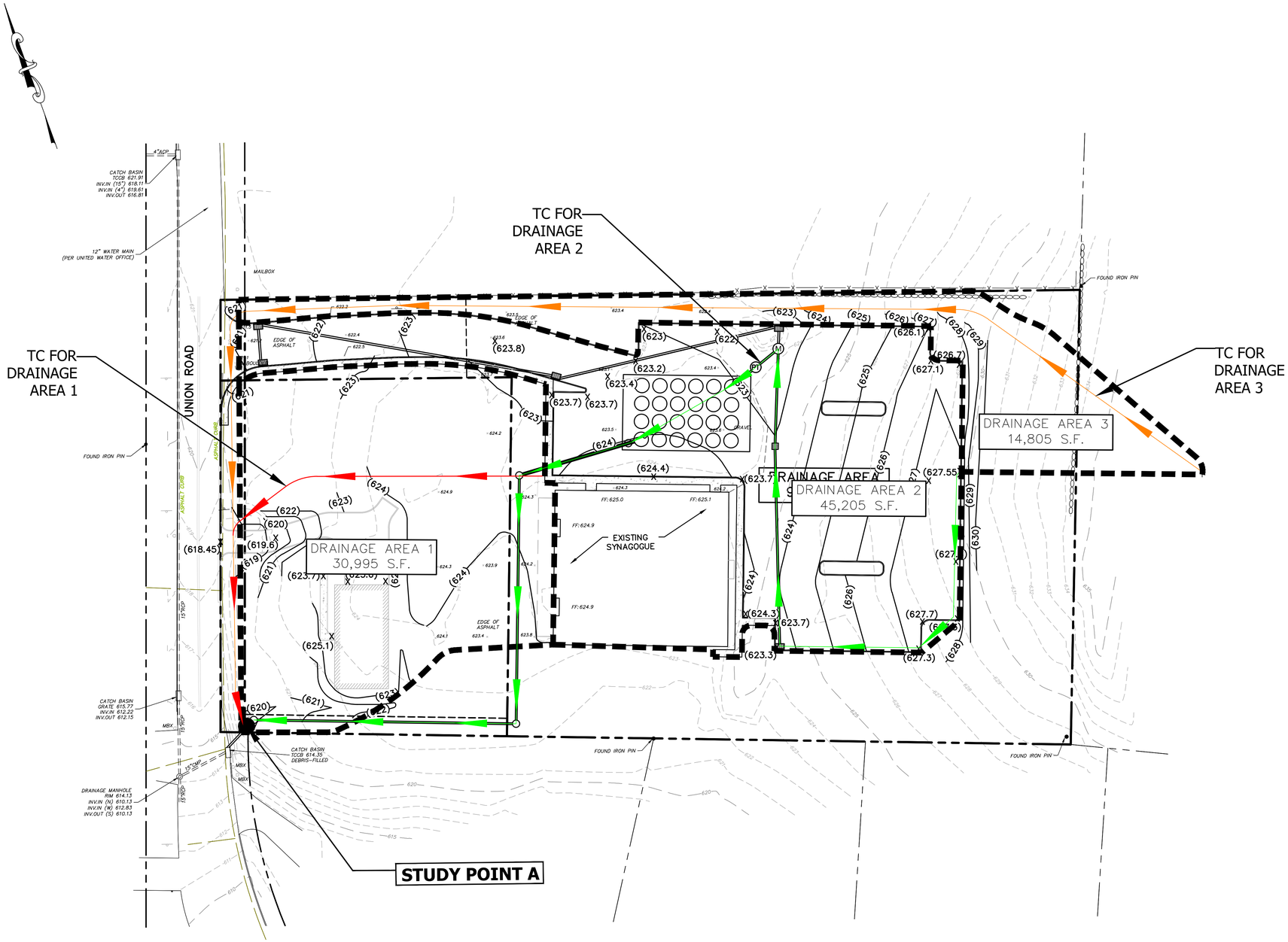
CONGREGATION KNESSET ISRAEL
VILLAGE OF NEW HEMPSTEAD
ROCKLAND COUNTY, NEW YORK

EXISTING CONDITIONS

Job number: 23005
Drawn by: AK
Date: 11/20/24
Scale: 1"=30'
Drawing Number: 1



LEGEND

- TC DRAINAGE AREA 1
- TC DRAINAGE AREA 2
- TC DRAINAGE AREA 3

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

REV.	DESCRIPTION	DATE
1	REVISED BULK TABLE	05/09/24

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CONGREGATION KNESSET ISRAEL
VILLAGE OF NEW HEMPSTEAD
ROCKLAND COUNTY, NEW YORK

PROPOSED CONDITIONS

Job number: 23005
Drawn by: AK
Date: 11/20/24
Scale: 1"=30'
Drawing Number: 2

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Appendix B

NOAA Atlas 14, Volume 10, Version 3
Location name: Spring Valley, New York, USA*
Latitude: 41.1406°, Longitude: -74.0552°
Elevation: 625 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.369** (0.287-0.465)	**0.435** (0.338-0.549)	**0.543** (0.421-0.688)	**0.633** (0.487-0.805)	**0.756** (0.563-1.00)	**0.850** (0.621-1.15)	**0.947** (0.668-1.32)	**1.05** (0.708-1.50)	**1.19** (0.771-1.76)	**1.30** (0.823-1.96)
10-min	**0.522** (0.406-0.659)	**0.616** (0.479-0.778)	**0.769** (0.596-0.975)	**0.896** (0.690-1.14)	**1.07** (0.798-1.42)	**1.20** (0.878-1.62)	**1.34** (0.947-1.86)	**1.49** (1.00-2.12)	**1.68** (1.09-2.49)	**1.84** (1.17-2.77)
15-min	**0.614** (0.478-0.775)	**0.725** (0.563-0.916)	**0.905** (0.701-1.15)	**1.06** (0.812-1.34)	**1.26** (0.939-1.67)	**1.42** (1.03-1.91)	**1.58** (1.11-2.19)	**1.75** (1.18-2.50)	**1.98** (1.28-2.92)	**2.17** (1.37-3.26)
30-min	**0.848** (0.660-1.07)	**0.998** (0.776-1.26)	**1.24** (0.963-1.58)	**1.45** (1.11-1.84)	**1.73** (1.29-2.28)	**1.94** (1.42-2.62)	**2.16** (1.52-3.00)	**2.39** (1.61-3.42)	**2.71** (1.76-4.00)	**2.96** (1.87-4.45)
60-min	**1.08** (0.841-1.36)	**1.27** (0.988-1.61)	**1.58** (1.23-2.00)	**1.84** (1.42-2.34)	**2.20** (1.64-2.90)	**2.47** (1.80-3.32)	**2.74** (1.94-3.81)	**3.03** (2.05-4.33)	**3.43** (2.22-5.06)	**3.74** (2.37-5.63)
2-hr	**1.45** (1.14-1.82)	**1.68** (1.32-2.11)	**2.06** (1.61-2.60)	**2.38** (1.85-3.01)	**2.82** (2.11-3.70)	**3.15** (2.31-4.21)	**3.49** (2.48-4.82)	**3.85** (2.61-5.46)	**4.36** (2.84-6.39)	**4.76** (3.02-7.11)
3-hr	**1.69** (1.33-2.11)	**1.96** (1.54-2.45)	**2.41** (1.89-3.02)	**2.78** (2.16-3.50)	**3.29** (2.48-4.30)	**3.67** (2.71-4.90)	**4.07** (2.91-5.62)	**4.51** (3.06-6.37)	**5.12** (3.34-7.47)	**5.61** (3.57-8.35)
6-hr	**2.11** (1.67-2.61)	**2.49** (1.97-3.09)	**3.12** (2.46-3.88)	**3.64** (2.85-4.56)	**4.35** (3.30-5.68)	**4.89** (3.63-6.51)	**5.46** (3.92-7.51)	**6.09** (4.14-8.55)	**6.99** (4.57-10.1)	**7.72** (4.93-11.4)
12-hr	**2.52** (2.01-3.10)	**3.07** (2.45-3.78)	**3.97** (3.15-4.91)	**4.71** (3.72-5.86)	**5.74** (4.38-7.45)	**6.51** (4.86-8.62)	**7.32** (5.31-10.0)	**8.25** (5.64-11.5)	**9.59** (6.29-13.8)	**10.7** (6.84-15.7)
24-hr	**2.94** (2.36-3.59)	**3.64** (2.92-4.46)	**4.78** (3.83-5.88)	**5.73** (4.56-7.08)	**7.04** (5.41-9.09)	**8.02** (6.03-10.6)	**9.06** (6.61-12.4)	**10.3** (7.04-14.2)	**12.0** (7.91-17.2)	**13.5** (8.66-19.7)
2-day	**3.39** (2.75-4.13)	**4.17** (3.38-5.08)	**5.44** (4.39-6.65)	**6.50** (5.21-7.98)	**7.96** (6.16-10.2)	**9.04** (6.84-11.8)	**10.2** (7.50-13.9)	**11.6** (7.96-15.9)	**13.6** (8.97-19.3)	**15.3** (9.84-22.1)
3-day	**3.72** (3.03-4.51)	**4.53** (3.68-5.50)	**5.86** (4.75-7.13)	**6.97** (5.60-8.52)	**8.48** (6.59-10.8)	**9.61** (7.31-12.6)	**10.8** (7.99-14.7)	**12.3** (8.46-16.8)	**14.4** (9.54-20.4)	**16.2** (10.5-23.4)
4-day	**4.00** (3.26-4.83)	**4.84** (3.95-5.85)	**6.22** (5.05-7.54)	**7.36** (5.94-8.97)	**8.93** (6.96-11.4)	**10.1** (7.70-13.2)	**11.4** (8.40-15.4)	**12.8** (8.88-17.6)	**15.1** (10.0-21.3)	**17.0** (11.0-24.5)
7-day	**4.74**	**5.66**	**7.15**	**8.40**	**10.1**	**11.4**	**12.7**	**14.4**	**16.8**	**18.8**

	(3.89-5.70)	(4.64-6.80)	(5.84-8.63)	(6.81-10.2)	(7.92-12.8)	(8.71-14.7)	(9.46-17.1)	(9.96-19.5)	(11.1-23.5)	(12.2-26.9)
10-day	**5.45** (4.49-6.52)	**6.42** (5.29-7.70)	**8.02** (6.57-9.64)	**9.34** (7.61-11.3)	**11.2** (8.76-14.1)	**12.5** (9.60-16.1)	**14.0** (10.4-18.6)	**15.6** (10.9-21.2)	**18.1** (12.1-25.3)	**20.2** (13.1-28.7)
20-day	**7.62** (6.33-9.06)	**8.73** (7.24-10.4)	**10.5** (8.70-12.6)	**12.0** (9.87-14.4)	**14.1** (11.1-17.5)	**15.7** (12.0-19.9)	**17.3** (12.8-22.6)	**19.0** (13.3-25.6)	**21.5** (14.4-29.8)	**23.4** (15.2-33.1)
30-day	**9.44** (7.88-11.2)	**10.6** (8.86-12.6)	**12.6** (10.4-15.0)	**14.2** (11.7-17.0)	**16.4** (13.0-20.3)	**18.1** (14.0-22.8)	**19.9** (14.7-25.8)	**21.6** (15.2-28.9)	**24.0** (16.1-33.2)	**25.8** (16.8-36.4)
45-day	**11.7** (9.81-13.8)	**13.0** (10.9-15.3)	**15.1** (12.6-17.9)	**16.9** (14.0-20.1)	**19.3** (15.3-23.7)	**21.2** (16.3-26.4)	**23.0** (17.0-29.5)	**24.8** (17.5-33.0)	**27.1** (18.2-37.2)	**28.7** (18.8-40.4)
60-day	**13.6** (11.4-16.0)	**15.0** (12.6-17.6)	**17.2** (14.4-20.3)	**19.1** (15.8-22.6)	**21.6** (17.2-26.4)	**23.6** (18.3-29.4)	**25.6** (18.9-32.6)	**27.4** (19.4-36.3)	**29.6** (20.0-40.6)	**31.2** (20.4-43.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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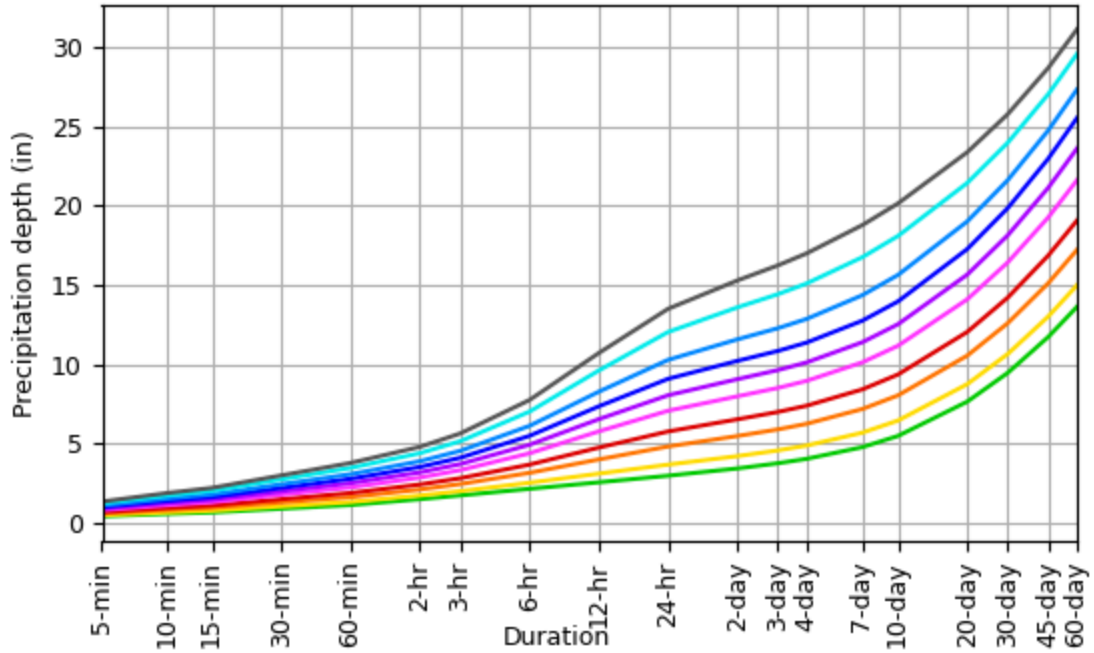
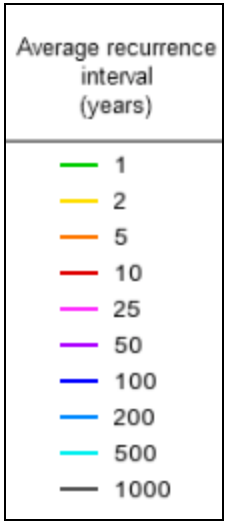
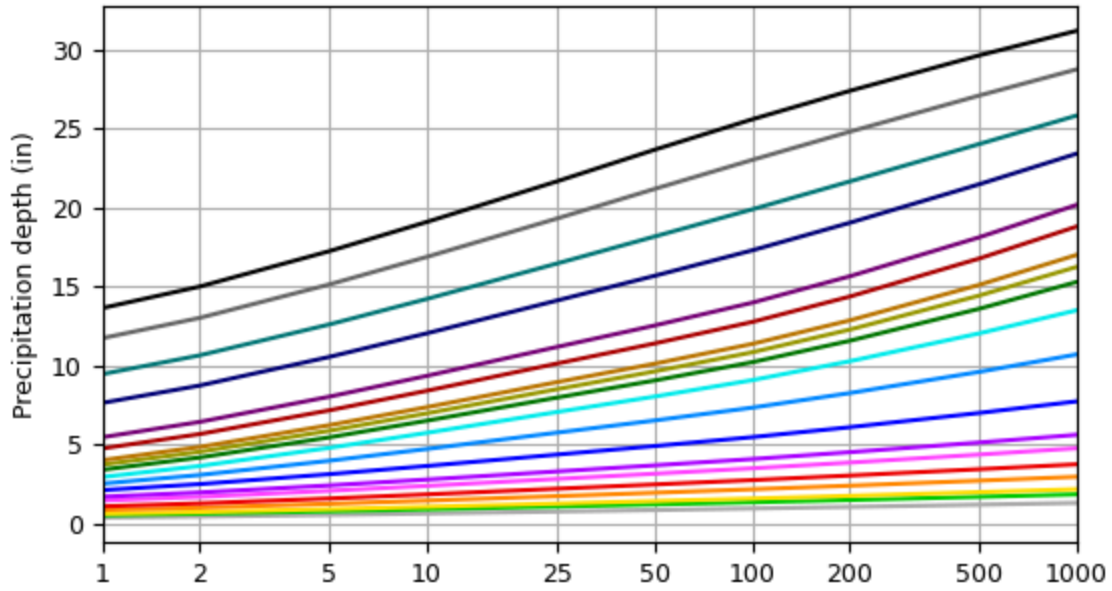
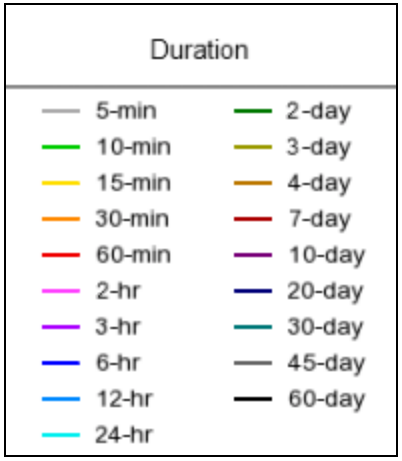
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.1406°, Longitude: -74.0552°









Average recurrence interval (years)

NOAA Atlas 14, Volume 10, Version 3 Created (GMT): Sun Sep 29 21:19:52 2024

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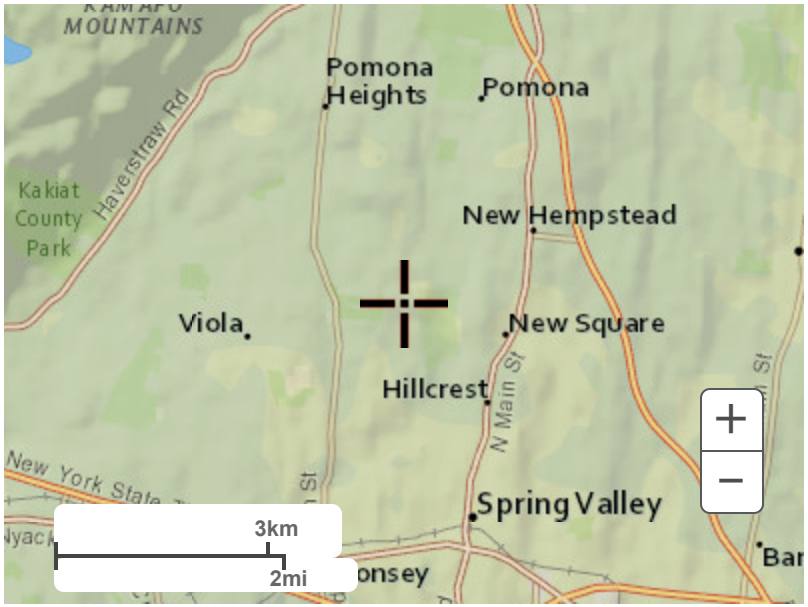
Maps & aerials

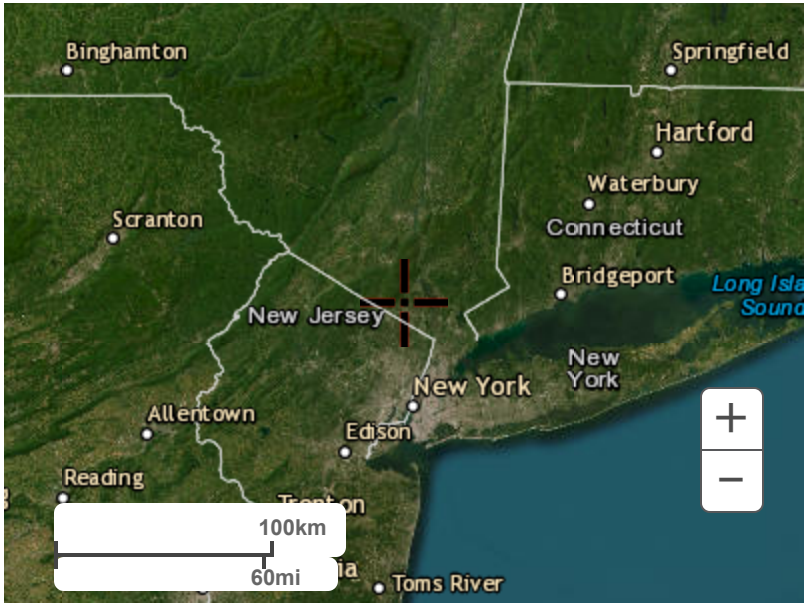
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Map Scale: 1:970 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rockland County, New York
Survey Area Data: Version 21, Sep 6, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 31, 2022—Oct 27, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrB	Cheshire gravelly fine sandy loam, 2 to 8 percent slopes	4.6	100.0%
Totals for Area of Interest		**4.6**	**100.0%**

Rockland County, New York

CrB—Cheshire gravelly fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9v46
Elevation: 50 to 670 feet
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cheshire and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cheshire

Setting

Landform: Hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mostly from reddish sandstone, shale, and conglomerate

Typical profile

H1 - 0 to 10 inches: gravelly fine sandy loam
H2 - 10 to 22 inches: gravelly fine sandy loam
H3 - 22 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F145XY013CT - Well Drained Till Uplands

Hydric soil rating: No

Minor Components

Watchaug
Percent of map unit: 5 percent
Hydric soil rating: No

Cheshire, very stony
Percent of map unit: 5 percent
Hydric soil rating: No

Wethersfield
Percent of map unit: 5 percent
Hydric soil rating: No

Yalesville
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Rockland County, New York
Survey Area Data: Version 21, Sep 6, 2023

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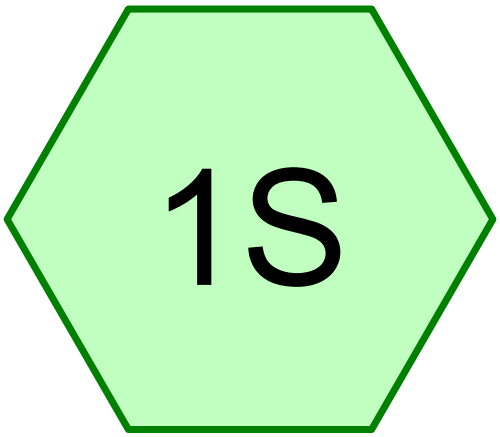
Appendix C



Existing Conditions

Subcat Reach Pond Link

Routing Diagram for Knesses EX
Prepared by WeinbergLim Engineering, Printed 12/3/2024

Project Notes

Rainfall events imported from "Knesses DEV.hcp"

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	Spring Valley 10yr	Type III 24-hr		Default	24.00	1	5.73	2
2	Spring Valley 100yr	Type III 24-hr		Default	24.00	1	9.06	2
3	Spring Valley 1yr	Type III 24-hr		Default	24.00	1	2.94	2
4	Spring Valley 2yr	Type III 24-hr		Default	24.00	1	3.64	2
5	Spring Valley 5yr	Type III 24-hr		Default	24.00	1	4.78	2
6	Spring Valley 25yr	Type III 24-hr		Default	24.00	1	3.64	2

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
2.029	HSG B	1S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
2.029		**TOTAL AREA**

Summary for Subcatchment 1S: Existing Conditions

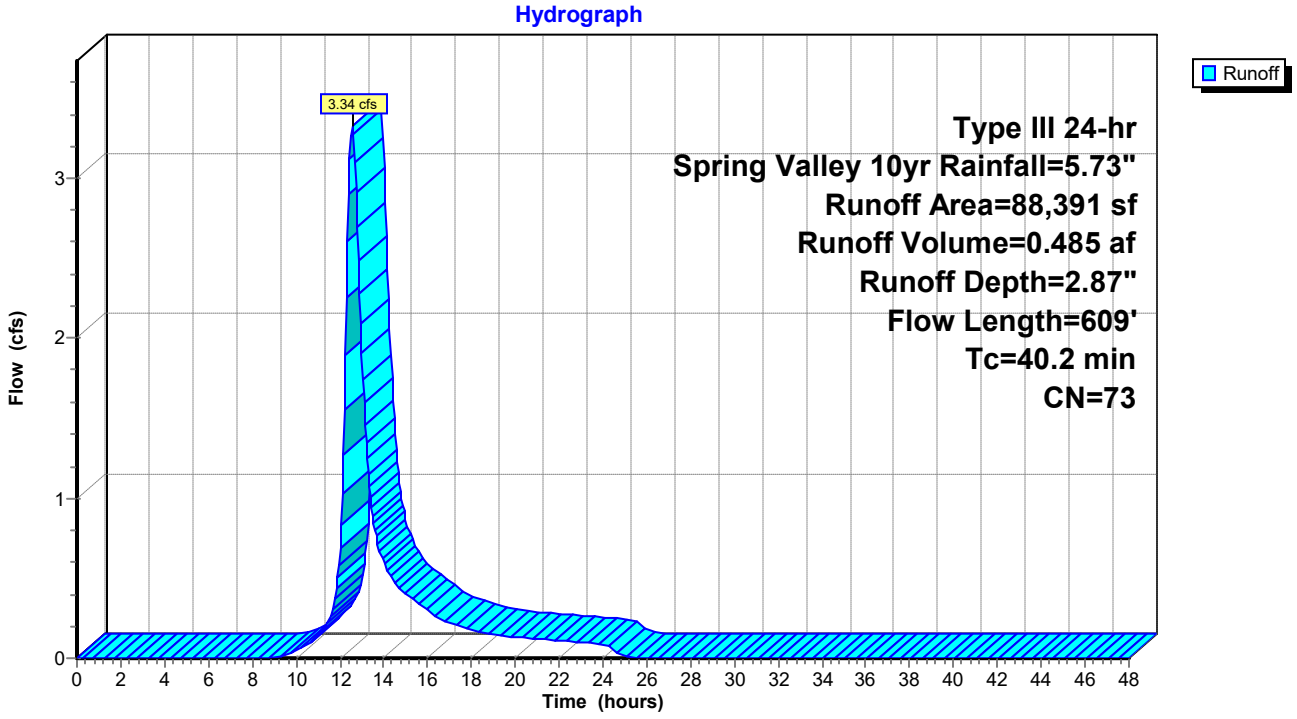
Runoff = 3.34 cfs @ 12.56 hrs, Volume= 0.485 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Spring Valley 10yr Rainfall=5.73"

Area (sf)	CN	Description
35,091	60	Woods, Fair, HSG B
29,574	98	Paved parking, HSG B
23,726	61	>75% Grass cover, Good, HSG B
88,391	73	Weighted Average
58,817		66.54% Pervious Area
29,574		33.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	270	0.0630	0.16		**Sheet Flow, woods in back** Woods: Light underbrush n= 0.400 P2= 3.64"
2.1	194	0.0155	1.51		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 3.64"
9.9	145	0.0345	0.24		**Sheet Flow, grass in front** Grass: Short n= 0.150 P2= 3.64"
40.2	609	Total			

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 1S: Existing Conditions

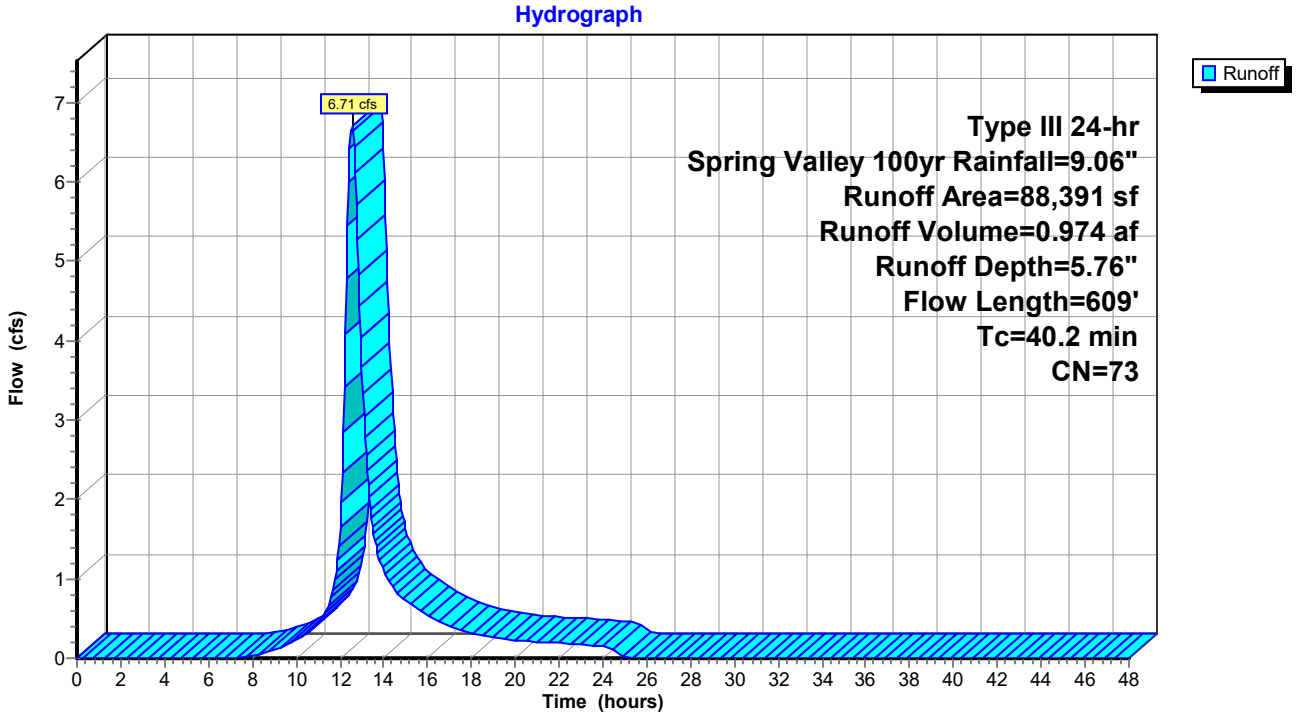
Runoff = 6.71 cfs @ 12.55 hrs, Volume= 0.974 af, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Spring Valley 100yr Rainfall=9.06"

Area (sf)	CN	Description
35,091	60	Woods, Fair, HSG B
29,574	98	Paved parking, HSG B
23,726	61	>75% Grass cover, Good, HSG B
88,391	73	Weighted Average
58,817		66.54% Pervious Area
29,574		33.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	270	0.0630	0.16		**Sheet Flow, woods in back** Woods: Light underbrush n= 0.400 P2= 3.64"
2.1	194	0.0155	1.51		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 3.64"
9.9	145	0.0345	0.24		**Sheet Flow, grass in front** Grass: Short n= 0.150 P2= 3.64"
40.2	609	Total			

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 1S: Existing Conditions

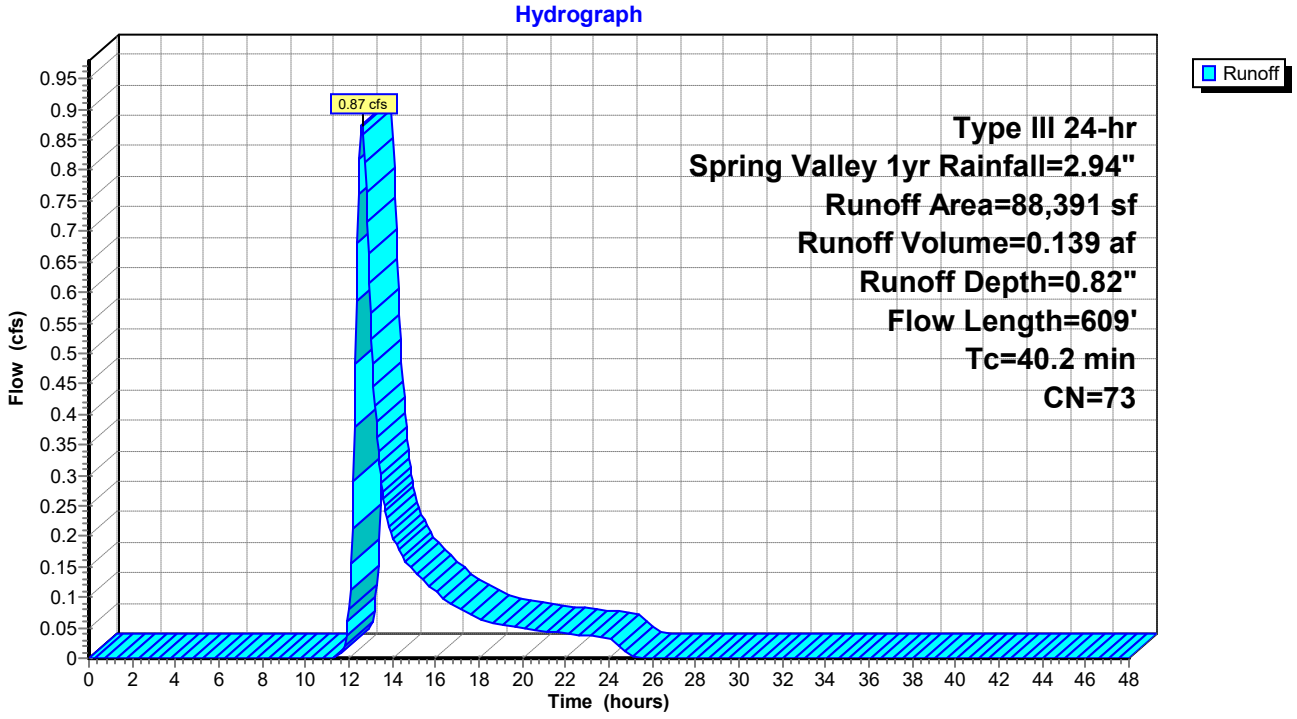
Runoff = 0.87 cfs @ 12.62 hrs, Volume= 0.139 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Spring Valley 1yr Rainfall=2.94"

Area (sf)	CN	Description
35,091	60	Woods, Fair, HSG B
29,574	98	Paved parking, HSG B
23,726	61	>75% Grass cover, Good, HSG B
88,391	73	Weighted Average
58,817		66.54% Pervious Area
29,574		33.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	270	0.0630	0.16		**Sheet Flow, woods in back** Woods: Light underbrush n= 0.400 P2= 3.64"
2.1	194	0.0155	1.51		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 3.64"
9.9	145	0.0345	0.24		**Sheet Flow, grass in front** Grass: Short n= 0.150 P2= 3.64"
40.2	609	Total			

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 1S: Existing Conditions

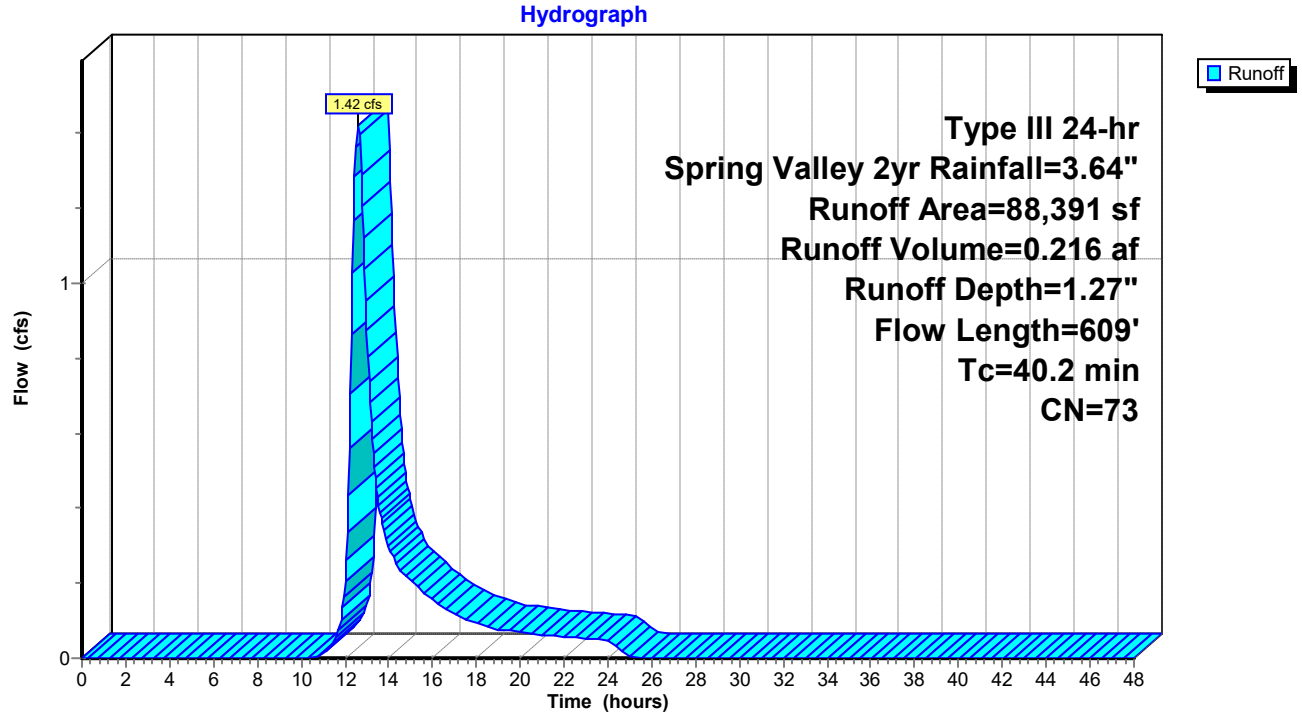
Runoff = 1.42 cfs @ 12.59 hrs, Volume= 0.216 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Spring Valley 2yr Rainfall=3.64"

Area (sf)	CN	Description
35,091	60	Woods, Fair, HSG B
29,574	98	Paved parking, HSG B
23,726	61	>75% Grass cover, Good, HSG B
88,391	73	Weighted Average
58,817		66.54% Pervious Area
29,574		33.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	270	0.0630	0.16		**Sheet Flow, woods in back** Woods: Light underbrush n= 0.400 P2= 3.64"
2.1	194	0.0155	1.51		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 3.64"
9.9	145	0.0345	0.24		**Sheet Flow, grass in front** Grass: Short n= 0.150 P2= 3.64"
40.2	609	Total			

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 1S: Existing Conditions

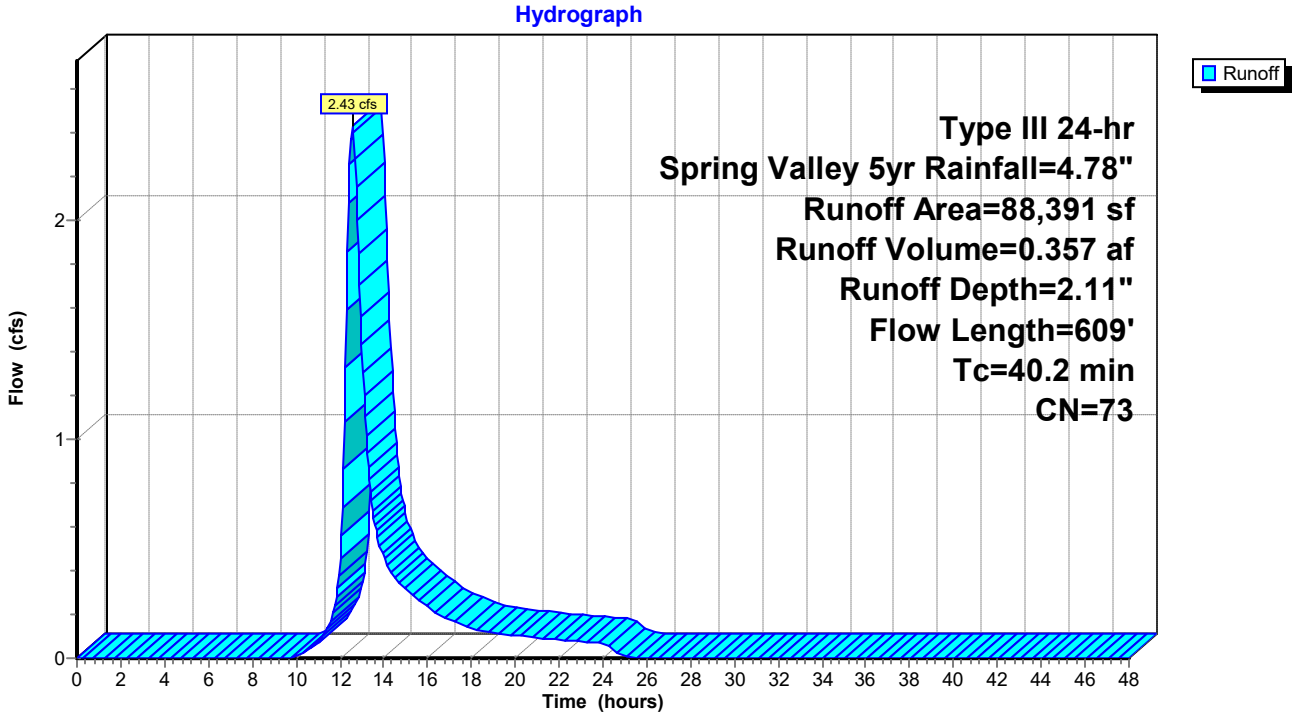
Runoff = 2.43 cfs @ 12.57 hrs, Volume= 0.357 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Spring Valley 5yr Rainfall=4.78"

Area (sf)	CN	Description
35,091	60	Woods, Fair, HSG B
29,574	98	Paved parking, HSG B
23,726	61	>75% Grass cover, Good, HSG B
88,391	73	Weighted Average
58,817		66.54% Pervious Area
29,574		33.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	270	0.0630	0.16		**Sheet Flow, woods in back** Woods: Light underbrush n= 0.400 P2= 3.64"
2.1	194	0.0155	1.51		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 3.64"
9.9	145	0.0345	0.24		**Sheet Flow, grass in front** Grass: Short n= 0.150 P2= 3.64"
40.2	609	Total			

Subcatchment 1S: Existing Conditions



Summary for Subcatchment 1S: Existing Conditions

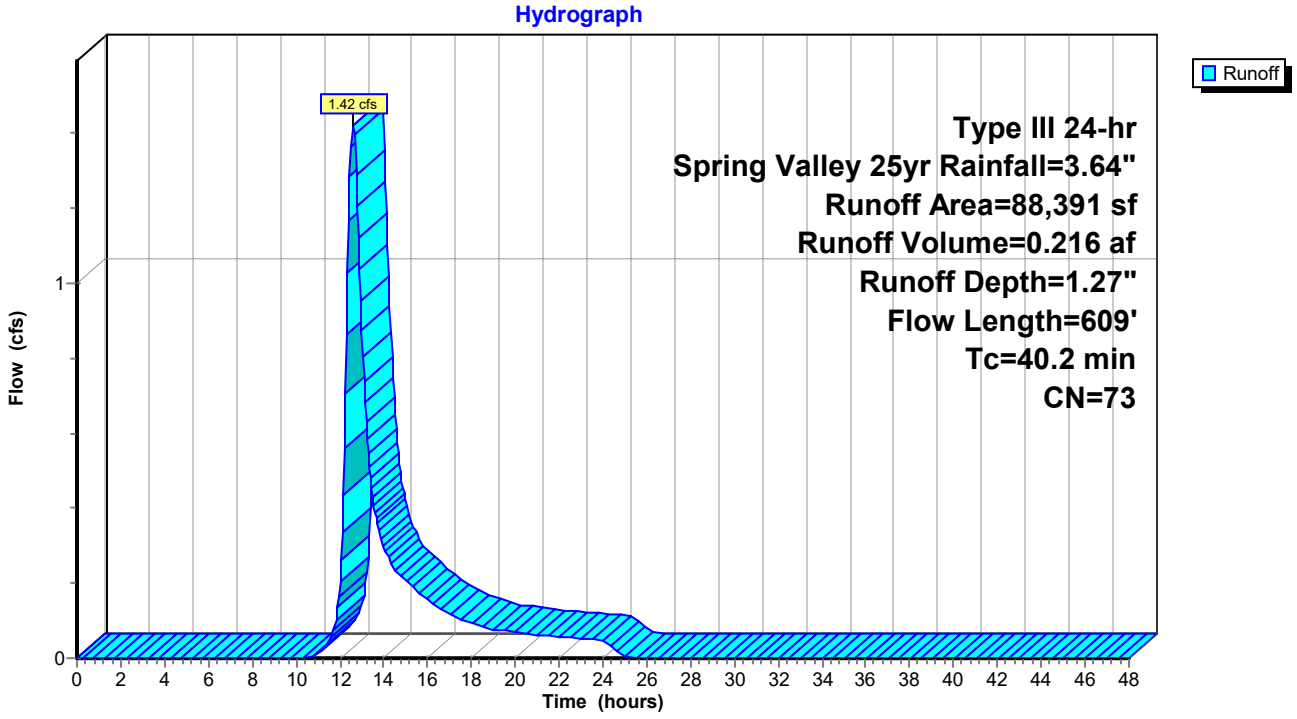
Runoff = 1.42 cfs @ 12.59 hrs, Volume= 0.216 af, Depth= 1.27"

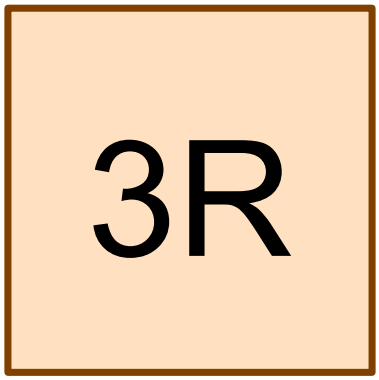
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr Spring Valley 25yr Rainfall=3.64"

Area (sf)	CN	Description
35,091	60	Woods, Fair, HSG B
29,574	98	Paved parking, HSG B
23,726	61	>75% Grass cover, Good, HSG B
88,391	73	Weighted Average
58,817		66.54% Pervious Area
29,574		33.46% Impervious Area

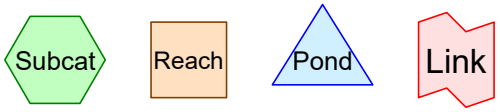
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	270	0.0630	0.16		**Sheet Flow, woods in back** Woods: Light underbrush n= 0.400 P2= 3.64"
2.1	194	0.0155	1.51		**Sheet Flow, parking lot** Smooth surfaces n= 0.011 P2= 3.64"
9.9	145	0.0345	0.24		**Sheet Flow, grass in front** Grass: Short n= 0.150 P2= 3.64"
40.2	609	Total			

Subcatchment 1S: Existing Conditions





Proposed Conditions



Routing Diagram for Knesses TEST1 DEV-AW
Prepared by WeinbergLim Engineering, Printed 12/3/2024

Project Notes

Rainfall events imported from "Knesses EX.hcp"
Rainfall events imported from "Knesses EX.hcp"

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	Spring Valley 10yr	Type III 24-hr		Default	24.00	1	5.73	2
2	Spring Valley 100yr	Type III 24-hr		Default	24.00	1	9.06	2
3	Spring Valley 1yr	Type III 24-hr		Default	24.00	1	2.94	2
4	Spring Valley 2yr	Type III 24-hr		Default	24.00	1	3.64	2
5	Spring Valley 5yr	Type III 24-hr		Default	24.00	1	4.78	2
6	Spring Valley 25yr	Type III 24-hr		Default	24.00	1	3.64	2

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.000		**TOTAL AREA**

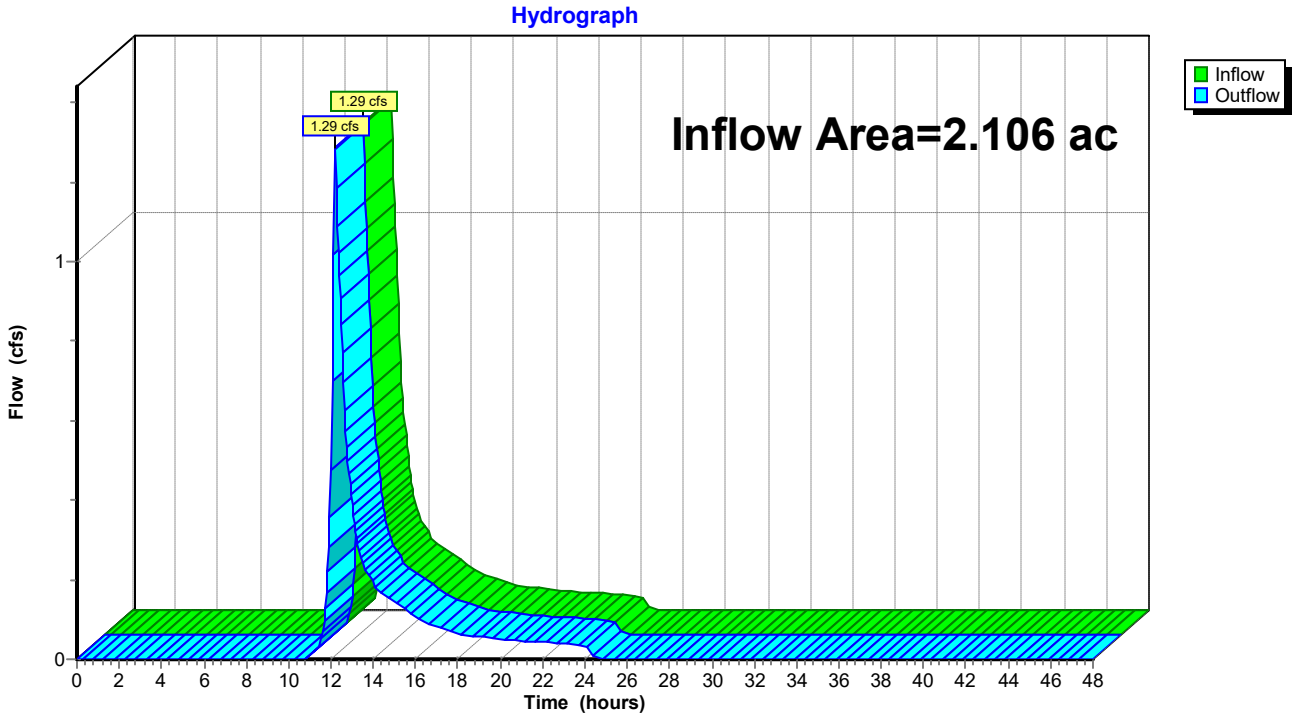
Summary for Reach 3R: Proposed Conditions

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.106 ac, 50.73% Impervious, Inflow Depth = 0.89" for Spring Valley 10yr event
Inflow = 1.29 cfs @ 12.19 hrs, Volume= 0.156 af
Outflow = 1.29 cfs @ 12.19 hrs, Volume= 0.156 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 3R: Proposed Conditions



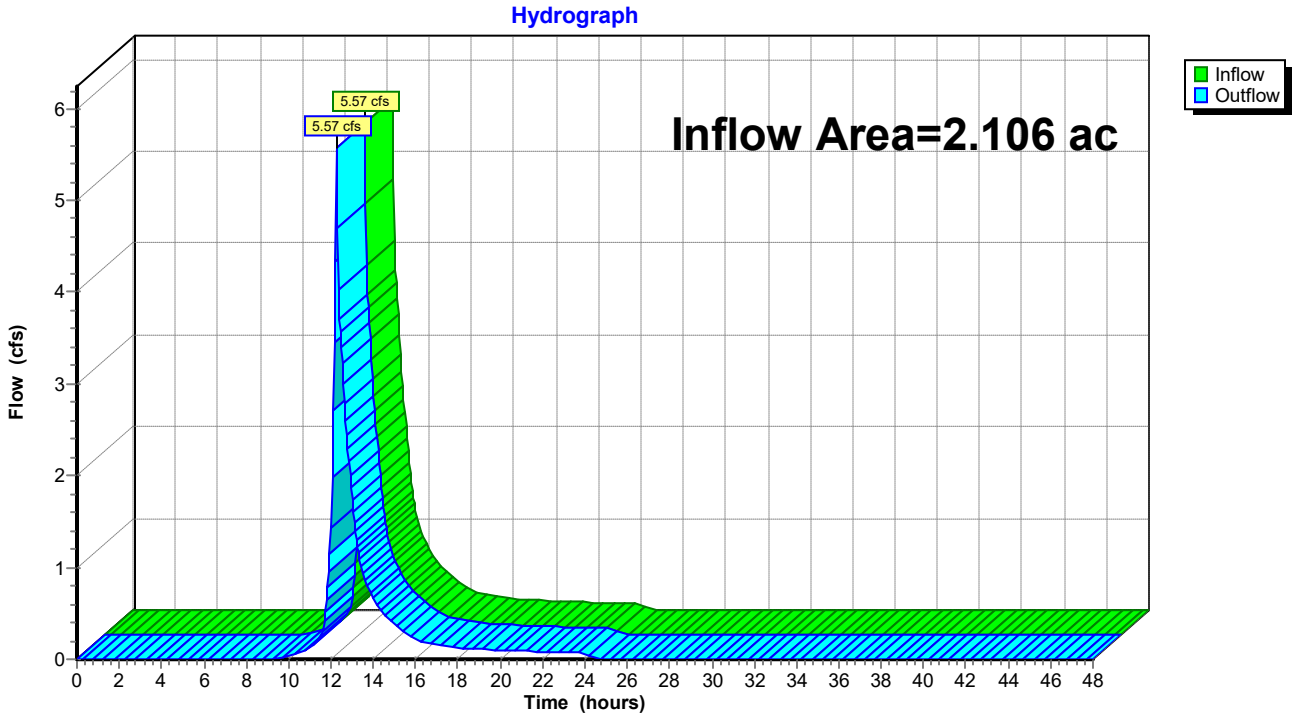
Summary for Reach 3R: Proposed Conditions

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.106 ac, 50.73% Impervious, Inflow Depth = 2.96" for Spring Valley 100yr event
Inflow = 5.57 cfs @ 12.25 hrs, Volume= 0.519 af
Outflow = 5.57 cfs @ 12.25 hrs, Volume= 0.519 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 3R: Proposed Conditions



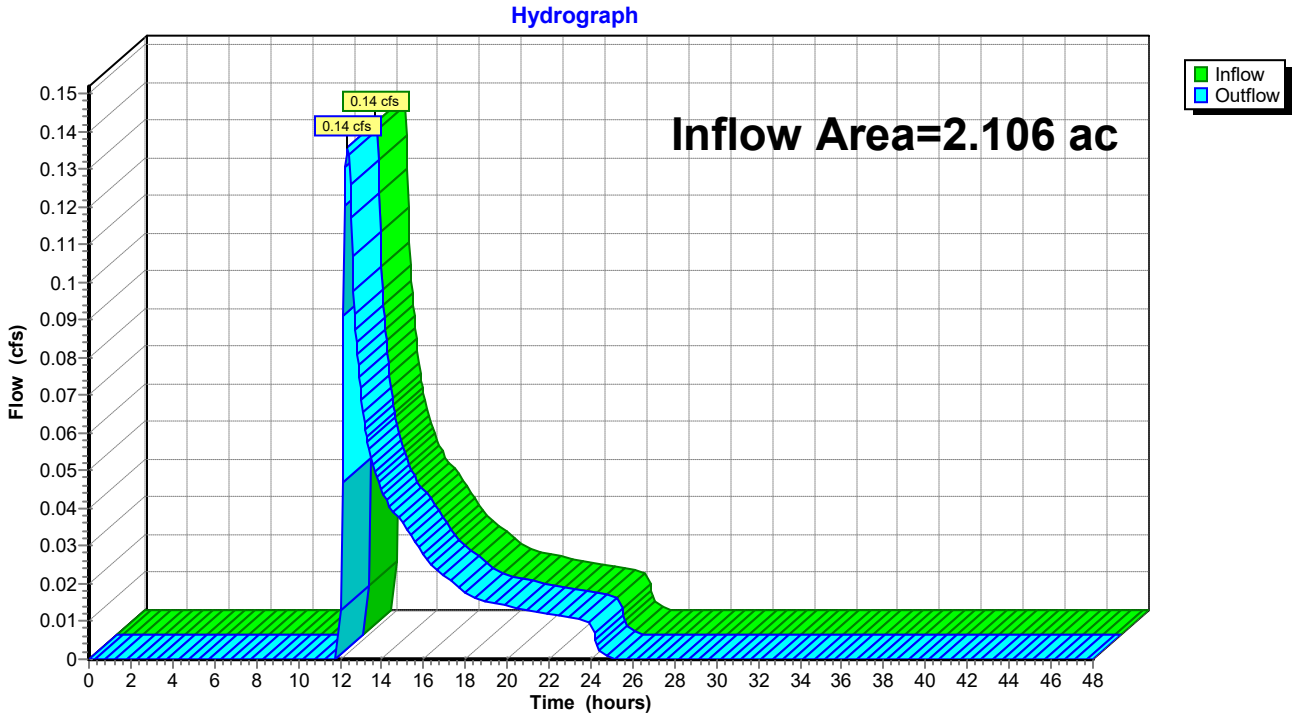
Summary for Reach 3R: Proposed Conditions

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.106 ac, 50.73% Impervious, Inflow Depth = 0.16" for Spring Valley 1yr event
Inflow = 0.14 cfs @ 12.37 hrs, Volume= 0.029 af
Outflow = 0.14 cfs @ 12.37 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 3R: Proposed Conditions



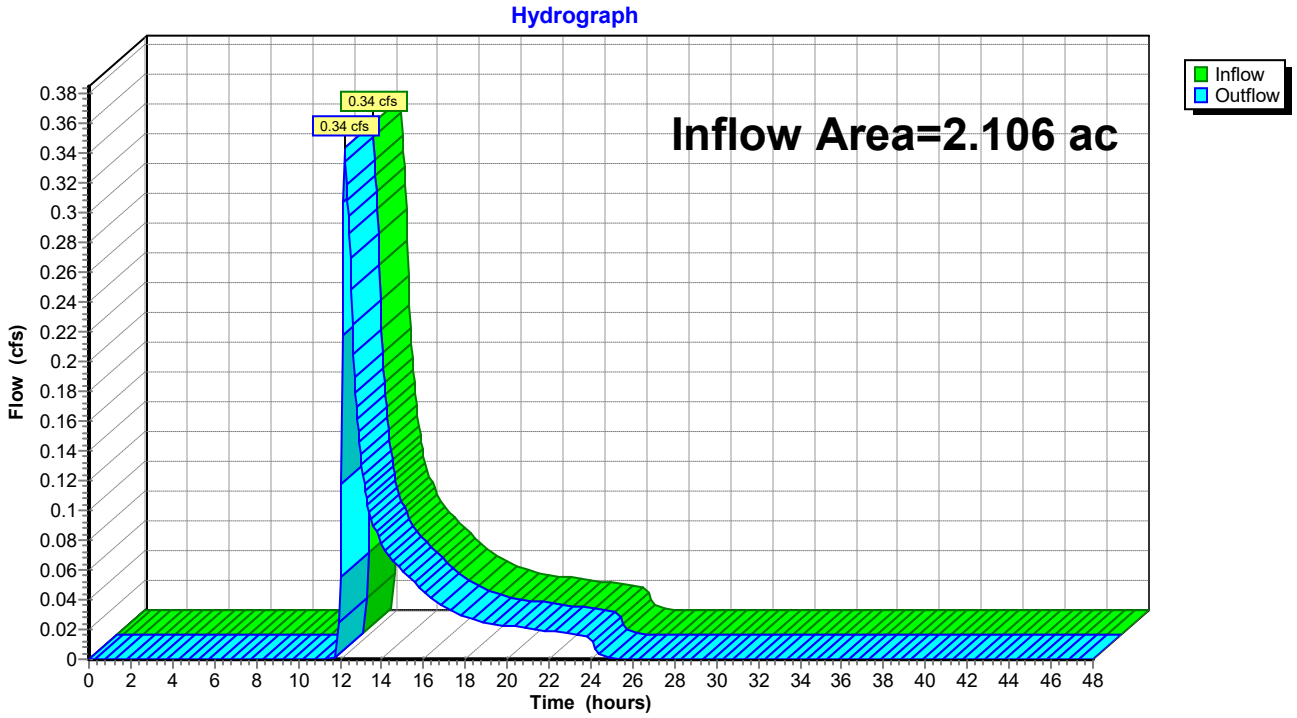
Summary for Reach 3R: Proposed Conditions

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.106 ac, 50.73% Impervious, Inflow Depth = 0.31" for Spring Valley 2yr event
Inflow = 0.34 cfs @ 12.22 hrs, Volume= 0.054 af
Outflow = 0.34 cfs @ 12.22 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 3R: Proposed Conditions



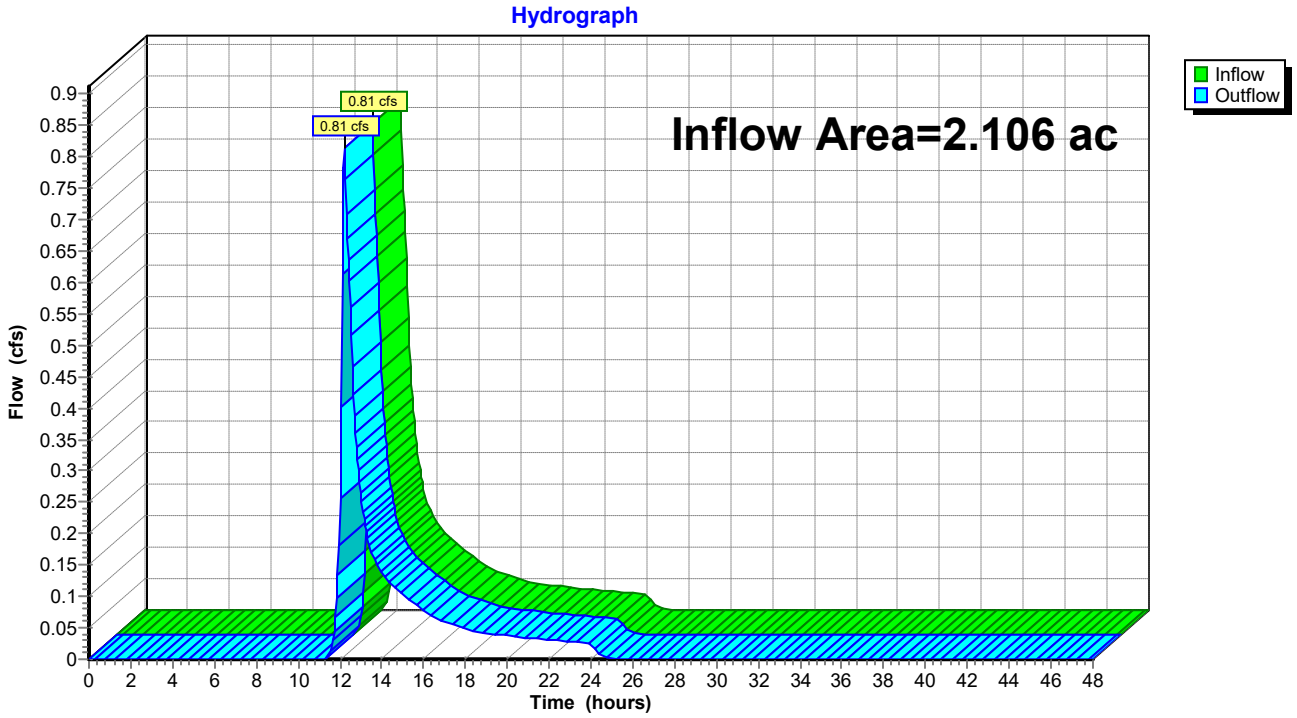
Summary for Reach 3R: Proposed Conditions

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.106 ac, 50.73% Impervious, Inflow Depth = 0.60" for Spring Valley 5yr event
Inflow = 0.81 cfs @ 12.19 hrs, Volume= 0.105 af
Outflow = 0.81 cfs @ 12.19 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 3R: Proposed Conditions



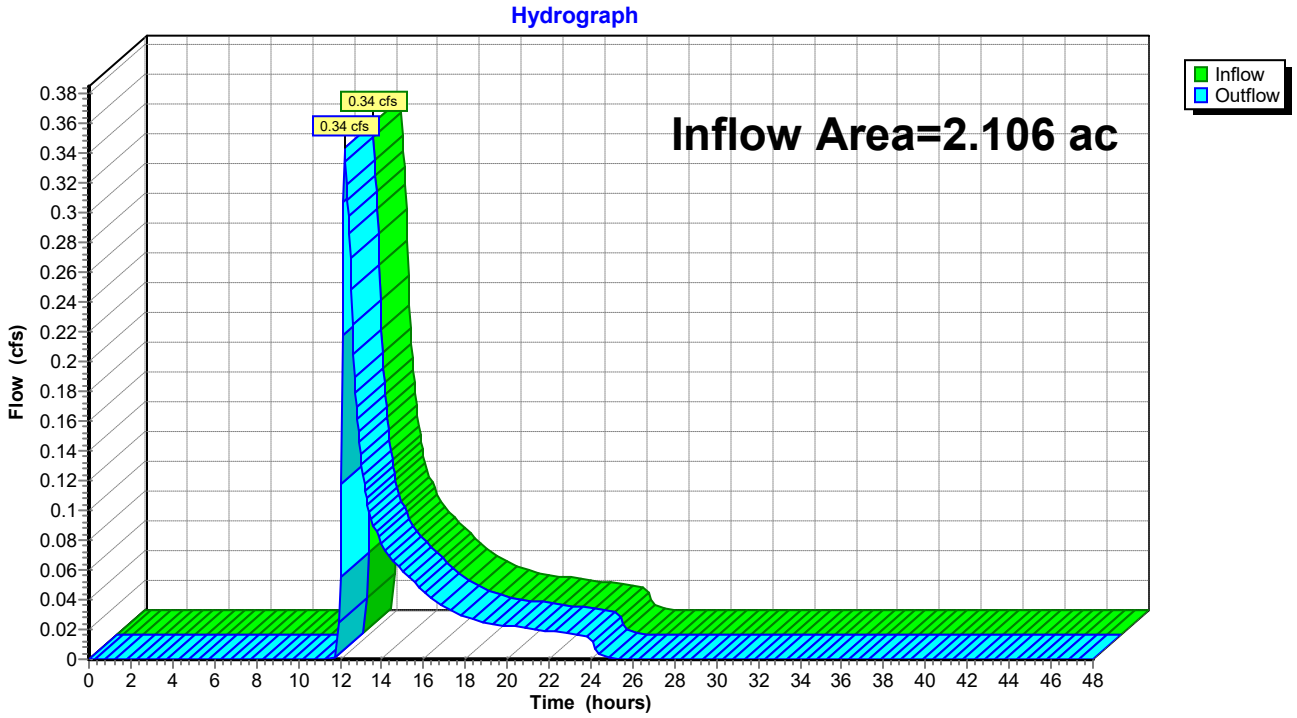
Summary for Reach 3R: Proposed Conditions

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.106 ac, 50.73% Impervious, Inflow Depth = 0.31" for Spring Valley 25yr event
Inflow = 0.34 cfs @ 12.22 hrs, Volume= 0.054 af
Outflow = 0.34 cfs @ 12.22 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Reach 3R: Proposed Conditions



WeinbergLim Engineering
(845) 570-0401 avi@weinberglim.com

Appendix D

WQv & RRv Calculations

Project	Congregation Knesses Israel
Job #	23005
Date	12/3/2024

WQv	**P*Rv*A/12**	
WQv	**0.0141**	**Acre feet**
P	1.5	in
I	48.18%	
Rv	0.054335792	
A	2.08	Acres
Total Drainage Area	90,497	SF
Lot B Area	85,485	SF
Impervious Area	43,597	SF

RRvmin	**P*Rv*Aic*S/12**	
RRvmin	**0.0015**	**Acre feet**
P	1.5	in
I	100.00%	
Rv	0.059	
Aic	0.50	
S (B)	0.4	
Increased Impervious Area	21,875	SF
	0.50	Acres

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

Bureau of NJPDES Stormwater Permitting & Water Quality Management
Division of Watershed Protection and Restoration
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432

SHAWN M. LATOURETTE
Acting Commissioner

April 28, 2021

Daniel J. Figola, P.E.
Director of Sustainability Development
Advanced Drainage Systems, Inc.
1030 Deer Hollow Drive
Mt. Airy, MD 21771

Re: MTD Lab Certification
Barracuda™ MAX Hydrodynamic Separator Stormwater Treatment Device
On-line Installation

TSS Removal Rate 50%

Dear Mr. Figola:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Advanced Drainage Systems, Inc. (ADS) has requested an MTD Laboratory Certification for the Barracuda™ MAX Hydrodynamic Separator stormwater treatment system (Barracuda™ MAX).

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated April 2021) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the Barracuda™ MAX stormwater treatment system at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The Barracuda™ MAX shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This Barracuda™ MAX cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 11.3 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Barracuda™ MAX. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://assets.ads-pipe.com/m/2c834056a5a22888/original/Barracuda-Maintenance-Guide-MG1-01.pdf for any changes to the maintenance requirements.

6. Sizing Requirement:

   The example on the following page demonstrates the sizing procedure for the Barracuda™ MAX:

Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using an Barracuda™ MAX treatment unit. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:
time of concentration = 10 minutes
i = 3.2 in/hr (page 74, Fig. 5-16 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs

Given the site runoff is 0.79 cfs and based on Table A-1 below, the Barracuda™ MAX Model S3 with an MTFR of 0.85 cfs would be the smallest model that could be used for this site to remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the NJCAT Technology Verification Appendix under Tables A-1 and A-2.

Table A-1 Barracuda™ MAX HDS Models and Associated MTFRs

Model	Manhole Diameter (ft)	Maximum Treatment Flow Rate (cfs)	50% Maximum Sediment Storage Area Volume (ft^3)
Barracuda MAX S3	3	0.85	5.89
Barracuda MAX S4	4	1.52	10.47
Barracuda MAX S5	5	2.37	16.36
Barracuda MAX S6	6	3.40	23.56
Barracuda MAX S8	8	6.08	41.89
Barracuda MAX S10	10	9.48	65.45

A detailed maintenance plan is mandatory for any project with a stormwater BMP subject to the Stormwater Management rules under N.J.A.C. 7:8. The plan must include all of the items identified in the Maintenance requirements section of the Stormwater Management rules under N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Lisa Schaefer of my office at lisa.schaefer@dep.nj.gov.

Sincerely,

Gabriel Mahon, Chief
Bureau of NJPDES Stormwater Permitting & Water Quality Management

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Changi Wu, NJDEP-BFHSE
Madhu Guru, NJDEP - BFHSE

Map Scale: 1:970 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 45 90 180 270

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rockland County, New York
Survey Area Data: Version 21, Sep 6, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 31, 2022—Oct 27, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrB	Cheshire gravelly fine sandy loam, 2 to 8 percent slopes	4.6	100.0%
Totals for Area of Interest		**4.6**	**100.0%**

Rockland County, New York

CrB—Cheshire gravelly fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9v46
Elevation: 50 to 670 feet
Mean annual precipitation: 47 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cheshire and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cheshire

Setting

Landform: Hills, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mostly from reddish sandstone, shale, and conglomerate

Typical profile

H1 - 0 to 10 inches: gravelly fine sandy loam
H2 - 10 to 22 inches: gravelly fine sandy loam
H3 - 22 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F145XY013CT - Well Drained Till Uplands

Hydric soil rating: No

Minor Components

Watchaug
Percent of map unit: 5 percent
Hydric soil rating: No

Cheshire, very stony
Percent of map unit: 5 percent
Hydric soil rating: No

Wethersfield
Percent of map unit: 5 percent
Hydric soil rating: No

Yalesville
Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Rockland County, New York
Survey Area Data: Version 21, Sep 6, 2023

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Appendix E

Barracuda® Max™ & Barracuda Maintenance Guide

One of Barracuda's advantages is the ease of maintenance. Like any system that collects pollutants, the Barracuda must be maintained for continued effectiveness. Maintenance is a simple procedure performed using a vacuum truck or similar equipment. The systems were designed to minimize the volume of water removed during routine maintenance, reducing disposal costs.

Contractors can access the pollutants stored in the manhole through the manhole cover. This allows them to gain vacuum hose access to the bottom of the manhole to remove sediment and trash. There is no confined space entry necessary for inspection or maintenance.

The entire maintenance procedure typically takes 2 to 4 hours, depending on the system's size, the captured material, and the vacuum truck's capacity.

Local regulations may apply to the maintenance procedure. Safe and legal disposal of pollutants is the responsibility of the maintenance contractor. Maintenance should be performed only by a qualified contractor.

Inspection and Cleaning Cycle

Periodic inspection is needed to determine the need for and frequency of maintenance. You should begin inspecting as soon as construction is complete and then on an annual basis. Typically, the system needs to be cleaned every 1-3 years.

Excessive oils, fuels or sediments may reduce the maintenance cycle. Periodic inspection is important.

Determining When to Clean

To determine the sediment depth, the maintenance contractor should lower a stadia rod into the manhole until it contacts the top of the captured sediment and mark that spot on the rod. Then push the probe through to the bottom of the sump and mark that spot to determine sediment depth.

Maintenance should occur when the sediment has reached the levels indicated in the Storage Capacity Chart.

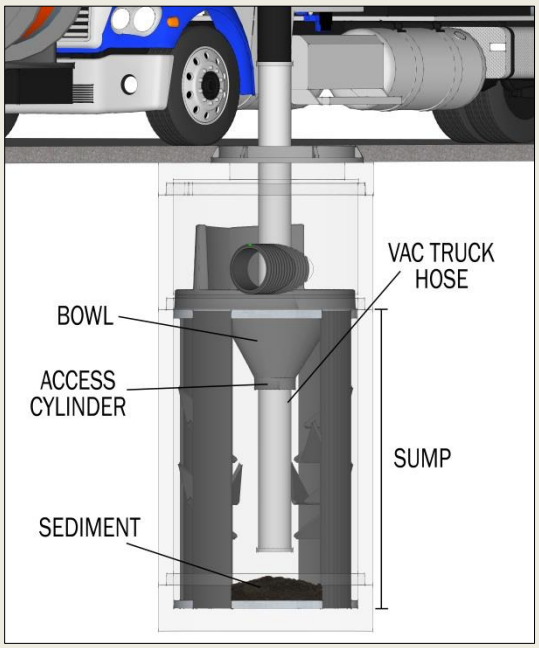
Barracuda Storage Capacities

Model	Manhole Diameter in. (mm)	Total System Volume Gallons (Liters)	Treatment Chamber Capacity Gallons (Liters)	Standard Sediment Capacity (20" depth) Yards^3 (meters^3)	NJDEP Sediment Capacity (50% of standard depth) Yards^3 (meters^3)
S3	36 (900)	264 (999)	212 (803)	0.44 (0.34)	0.22 (0.17)
S4	48 (1200)	665 (2517)	564 (2135)	0.78 (0.60)	0.39 (0.30)
S5	60 (1500)	1040 (3937)	881 (3335)	1.21 (0.93)	0.61 (0.47)
S6	72 (1800)	1497 (5667)	1269 (4804)	1.75 (1.34)	0.88 (0.67)
S8	96 (2400)	4196 (15884)	3835 (14517)	3.10 (2.37)	1.55 (1.19)
S10	120 (3000)	7976 (30192)	7496 (28375)	4.85 (3.71)	2.43 (1.86)

Maintenance Instructions

1. Remove the manhole cover to provide access to the pollutant storage. Pollutants are stored in the sump, below the bowl assembly visible from the surface. Access this area through the 8" (200 mm), 10" (250 mm), 15" (375 mm) or 20" (500 mm) diameter access cylinder.
2. Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment. See figure 1.
3. Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. Fill the cleaned manhole with water until the level reaches the invert of the outlet pipe.
5. Replace the manhole cover.
6. Dispose of the polluted water, oils, sediment and trash at an approved facility.
    a. Local regulations prohibit the discharge of solid material into the sanitary system. Check with the local sewer authority for authority to discharge the liquid.
    b. Some localities treat the pollutants as leachate. Check with local regulators about disposal requirements.
    c. Additional local regulations may apply to the maintenance procedure.

Figure 1



Maintenance Guide

BaySaver Barracuda™

July 2017

One of the advantages of the BaySaver Barracuda is the ease of maintenance. Like any system that collects pollutants, the BaySaver Barracuda must be maintained for continued effectiveness. Maintenance is a simple procedure performed using a vacuum truck or similar equipment. The systems were designed to minimize the volume of water removed during routine maintenance, reducing disposal costs.

Contractors can access the pollutants stored in the manhole through the manhole cover. This allows them to gain vacuum hose access to the bottom of the manhole to remove sediment and trash. There is no confined space entry necessary for inspection or maintenance.

The entire maintenance procedure typically takes from 2 to 4 hours, depending on the size of the system, the captured material, and the capacity of the vacuum truck.

Local regulations may apply to the maintenance procedure. Safe and legal disposal of pollutants is the responsibility of the maintenance contractor. Maintenance should be performed only by a qualified contractor.

Inspection and Cleaning Cycle

Periodic inspection is needed to determine the need for and frequency of maintenance. You should begin inspecting as soon as construction is complete and thereafter on an annual basis. Typically, the system needs to be cleaned every 1-3 years.

Excessive oils, fuels or sediments may reduce the maintenance cycle. Periodic inspection is important.

Determining When to Clean

To determine the sediment depth, the maintenance contractor should lower a stadia rod into the manhole until it contacts the top of the captured sediment and mark that spot on the rod. Then push the probe through to the bottom of the sump and mark that spot to determine sediment depth.

Maintenance should occur when the sediment has reached the levels indicated in the Storage Capacity Chart.

BaySaver Barracuda Storage Capacities

Model	Manhole Diameter	Treatment Chamber Capacity	Standard Sediment Capacity (20" depth)	NJDEP Sediment Capacity (50% of standard depth)
S3	36"	212 gallons	0.44 cubic yards	0.22 cubic yards
S4	48"	564 gallons	0.78 cubic yards	0.39 cubic yards
S5	60"	881 gallons	1.21 cubic yards	0.61 cubic yards
S6	72"	1269 gallons	1.75 cubic yards	0.88 cubic yards
S8	96"	3835 gallons	3.10 cubic yards	1.55 cubic yards
S10	120"	7496 gallons	4.85 cubic yards	2.43 cubic yards

Maintenance Instructions

1. Remove the manhole cover to provide access to the pollutant storage. Pollutants are stored in the sump, below the bowl assembly visible from the surface. You'll access this area through the 10" diameter access cylinder.

2. Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment. See figure 1.
3. Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. Fill the cleaned manhole with water until the level reaches the invert of the outlet pipe.
5. Replace the manhole cover.
6. Dispose of the polluted water, oils, sediment and trash at an approved facility.
   - Local regulations prohibit the discharge of solid material into the sanitary system. Check with the local sewer authority for authority to discharge the liquid.
   - Some localities treat the pollutants as leachate. Check with local regulators about disposal requirements.
   - Additional local regulations may apply to the maintenance procedure.

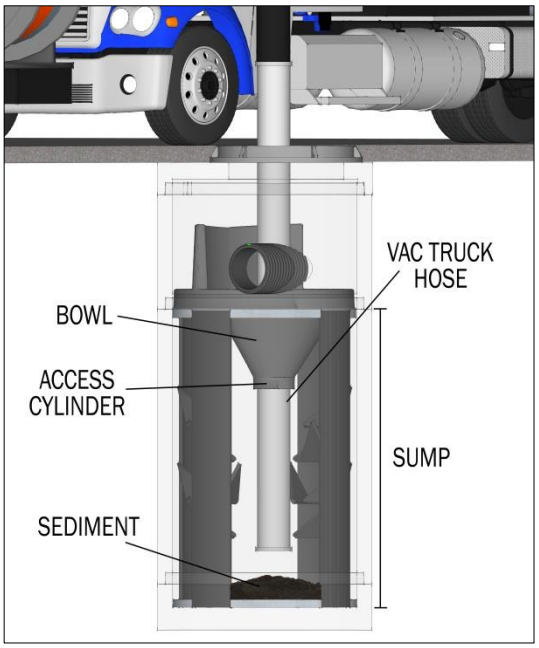


Figure 1